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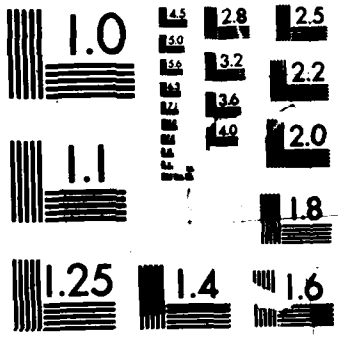

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FOREIGN TECHNOLOGY DIVISION

METHOD OF OBTAINING A HEAT-STABLE BINDER BASED ON AROMATIC DIMALEIMIDES

by

M.V. Barkova, L.V. Lebedeva, et al.

HUMAN TRANSLATION

Patent

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Block	Italic	Transliteration	Block	Italic	Transliteration
А а	*А а*	A, a	Р р	*Р р*	R, r
Б б	*Б б*	B, b	С с	*С с*	S, s
В в	*В в*	V, v	Т т	*Т т*	T, t
Г г	*Г г*	G, g	У у	*У у*	U, u
Д д	*Д д*	D, d	Ф ф	*Ф ф*	F, f
Е е	*Е е*	Ye, ye; E, e*	Х х	*Х х*	Kh, kh
Ж ж	*Ж ж*	Zh, zh	Ц ц	*Ц ц*	Ts, ts
З з	*З з*	Z, z	Ч ч	*Ч ч*	Ch, ch
И и	*И и*	I, i	Ш ш	*Ш ш*	Sh, sh
Й й	*Й й*	Y, y	Щ щ	*Щ щ*	Shch, shch
К к	*К к*	K, k	Ъ ъ	*Ъ ъ*	"
Л л	*Л л*	L, l	Ы ы	*Ы ы*	Y, y
М м	*М м*	M, m	Ь ь	*Ь ь*	'
Н н	*Н н*	N, n	Э э	*Э э*	E, e
О о	*О о*	O, o	Ю ю	*Ю ю*	Yu, yu
П п	*П п*	P, p	Я я	*Я я*	Ya, ya

*ye initially, after vowels, and after ъ, ь; e elsewhere.
When written as ё in Russian, transliterate as yё or ё.

RUSSIAN AND ENGLISH TRIGONOMETRIC FUNCTIONS

Russian	English	Russian	English	Russian	English
sin	sin	sh	sinh	arc sh	$\sinh^{-1}$
cos	cos	ch	cosh	arc ch	$\cosh^{-1}$
tg	tan	th	tanh	arc th	$\tanh^{-1}$
ctg	cot	cth	coth	arc cth	$\coth^{-1}$
sec	sec	sch	sech	arc sch	sech^{-1}
cosec	csc	csch	csch	arc csch	csch^{-1}

Russian	English
rot	curl
lg	log

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METHOD OF OBTAINING A HEAT-STABLE BINDER BASED ON AROMATIC DIMALEIMIDES

M. V. Barkova, L. V. Lebedeva, L. K. Afinogenova,
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1. This invention is a method of obtaining a heat-stable binder based on aromatic dimaleimides which is different because in order to improve wettability and increase adhesion, reduce the solidification temperature and increase the solidification rate, aromatic dimaleimides (e.g., ortho-, para- and metaphenylenedimaleimides) are copolymerized with furyl alcohol.

2. A method as in para. 1 which is different because the aromatic dimaleimide and furyl alcohol are taken in a ratio of 1:1.

3. A method as in para. 1 which is different because the process is carried out in the presence of a solvent.

cont'd

This invention is in the field of the development of heat-stable binders, especially new heat-stable copolymers based on aromatic dimaleimides. (Russian translation)

We know of a method of obtaining a binder for fiberglass reinforced plastic based on metaphenylenedimaleimide and butadiene-styrene rubber SKS-30 in which the rubber is combined with dimaleimide with a ratio of from 0.25:1 to 2:1 on rollers with the subsequent suspension of the mixture in chloroform.

The problem with these binders is their heterogeneity, as well as the need for combining high temperatures (200-250°C), a long holding time (1-2 h) and subsequent prolonged (4-6 h) heat treatment at a temperature of up to 300° in order to solidify them.

In order to improve the binder's technological characteristics - to increase homogeneity, improve wettability, increase adhesion, lower the solidification temperature and increase the solidification rate - a new method of obtaining heat-stable binders based on aromatic dimaleimides is being proposed. This method consists in the copolymerization of aromatic dimaleimides (e.g., ortho-, para- and metaphenylenedimaleimides) with furyl alcohol at a desired ratio of 1:1 both with and without a solvent.

The solidification conditions of the known and new binder are given in the table.

Table.

Solidification conditions	Binder	
	Known	Proposed
Temperature, °C	200-250	150-200
Time, min.	60-120	70-80
Heat treatment	4-6 h at 250-300°C	Heat treatment not required

The known binder, heat-treated and held at 300° for one hour, loses 1% of its weight.

The new binder, held under the same conditions, loses 1% of its weight without heat treatment.

Example 1. 100 g of furyl alcohol and 10 g of metaphenylene-dimaleimide are placed in a round-bottomed flask with a thermometer, a two-way refrigerator and an agitator. Without heating, the temperature of the reaction mixture at the end of the reaction (reaction time of 60-75 min.) is raised to 78-80°C. A highly ductile dark-brown copolymer is obtained whose ductile increases as the reaction mixture cools down. The copolymer is set at 60°C and dissolved in acetone, forming viscous homogeneous solutions. The gelation time at 140, 150 and 200° is 90, 55 and 5 min., respectively.

Example 2. Analogously to example 1, a viscous dark-brown copolymer solution is obtained from 100 g of furyl alcohol, 100 g of metaphenylenedimaleimide and 100 g of acetone after 2.5 hours. The process is carried out without heating, with the temperature of the reaction mixture increasing to 44-46°C at the end of the reaction. The viscosity of the copolymer obtained increases as the solvent is removed. The copolymer gelation time is the same as in example 1.

Example 3. A copolymer analogous to that obtained in example 1 is obtained from 100 g of furyl alcohol and 100 g of metaphenylene-dimaleimide, carrying out the reaction at 80°C for 20-30 min.

Example 4. Using 100 g of furyl alcohol, 100 g of metaphenylene-dimaleimide and 100 g of acetone in the device described in example 1, a copolymer analogous to that synthesized in example 2 is obtained after the reaction is carried out at 80°C for 25-40 min.

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